

## How Does One pH Compare to Another?

**Soil pH.** It is one of the most important chemical properties that affect nutrient interactions in soils and plants. It is, however, one of the most misunderstood measurements, particularly when comparing one pH value to another.


**A question that is often asked is, “How many times more acid is one pH than another?”** This question is not so straightforward to answer, because pH is not on a linear scale, like a ruler. Instead, it is on a negative log scale. Soils that are higher in acidity actually have smaller pH values, thanks to the negative log scale. The pH scale goes from 0 to 14. The 0 end of the scale is more acid. The 14 end is basic, and a pH of 7 is neutral, dividing acidic from basic. So we know that a pH of 5.8 is more acid than a pH of 6.6. But how many more times acid is it?

**To get at the answer to this question, we must first recognize that pH is a transformed measure of the concentration of acid.** To find out “how many more times acid” one pH value is than another, we have to do some mathematical manipulations to get us out of the negative log scale and back to a linear scale where such comparisons make sense.

**The table in the next column was developed from these mathematical manipulations and is provided to allow you to quickly determine how many times more acid a lower pH value is than a higher one.** To use the table, take the higher pH value and subtract the lower one. Look up the difference in the table, under the heading “pH difference.” Then look at the corresponding number in the

pH difference	Times more acid	pH difference	Times more acid	pH difference	Times more acid
0.1	1.3	1.1	13	2.1	126
0.2	1.6	1.2	16	2.2	158
0.3	2.0	1.3	20	2.3	200
0.4	2.5	1.4	25	2.4	251
0.5	3.2	1.5	32	2.5	316
0.6	4.0	1.6	40	2.6	398
0.7	5.0	1.7	50	2.7	501
0.8	6.3	1.8	63	2.8	631
0.9	7.9	1.9	79	2.9	794
1.0	10.0	2.0	100	3.0	1000

column to the right labeled “Times more acid.”

Using our example, we want to compare pH 5.8 and 6.6. We take the higher value and subtract the lower one:  $6.6 - 5.8 = 0.8$ . When we look up 0.8 in the table, we get 6.3. So the lower pH of 5.8 is 6.3 times more acid than the higher pH of 6.6. Using this table, you can easily determine how two pH values compare to one another, up to a difference of 3 pH units. For a more complete set of units, visit <http://nanc.ipni.net/articles/NANC0022-EN>. 

*This topic is adapted from a Plant Nutrition TODAY article authored by Dr. T. Scott Murrell, IPNI Northcentral Region Director, located at West Lafayette, Indiana; e-mail: smurrell@ipni.net.*

## IPNI Awards Available to Graduate Students and Scientists in 2011

**E**ach year, IPNI offers the Scholar Award to honor and encourage deserving graduate students, and also the IPNI Science Award to recognize and promote distinguished contributions by scientists.

“We receive very favorable reaction to these awards each year and they clearly have many positive benefits,” said IPNI President Dr. Terry Roberts. “It is important to encourage talented young people in their studies of agronomic and soil sciences, while established scientists also deserve recognition for career accomplishments. These awards are made possible by our member companies and are evidence of their respect for science.”

**The Scholar Award** requires students who are candidates for either a M.S. or Ph.D. degree in agronomy, soil science, or related fields to submit an application and supporting information by June 30. Individual graduate students in any country where an IPNI

program exists are eligible. Only a limited number of recipients are selected for the award, worth USD 2,000 (two thousand dollars) each. The application process is available on-line only. Recipients are announced in September.

**The Science Award** goes to one individual each year, based on outstanding achievements in research, extension, or education which focus on efficient and effective management of plant nutrients and their positive interaction in fully integrated crop production, enhancing yield potential and/or crop quality. It requires that a nomination form (no self-nomination) and supporting letters be submitted by mail before September 30. The Award announcement is December 1. It includes a monetary prize of USD 5,000 (five thousand dollars).

More information about past winners of these awards, plus details on qualifications and requirements for both awards, can be found at the IPNI website: [www.ipni.net/awards](http://www.ipni.net/awards). 